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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/605,081 | 09/08/2003 | TSUNG-YUEH TSAI | 10353-US-PA | 2080 |
| 31561 | 7590 | 12/23/2003 | EXAMINER | |
| JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN | | | BUI, HUNG S | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2841 | |

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/605,081 | TSAI ET AL. | |
| | Examiner | Art Unit | |
| | Hung S Bui | 2841 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by weld [US 5,696,405].

Regarding claims 1-2, Weld discloses a package structure that is compatible with a cooling system (figures 1-3), comprising:

- a carrier (12);
- at least a chip (18), arranged on the carrier and electrically connected to the carrier;
- a mold compound (22, column 3, line 1), covering the chip and one surface of the carrier (figure 1); and
- a cooling tubule (30) disposed within the mold compound (column 3, lines 19-21), wherein the cooling tubule is connected to the cooling system (figure 3) and wherein the cooling system is a closed system (figure 3) and a fluid (column 3, lines 34-46) driven by a pump (44) circulates within the cooling tubule and the cooling system (figure 3).

Regarding claim 3, Weld further discloses the fluid being selected from the group consisting of water, a coolant and a gas (column e, lines 34-46).

Regarding claim 4, Weld discloses the cooling system further comprising a cooler (42, figure 3) connected to the cooling tubing.

Regarding claims 5-6, Weld discloses a mold compound being formed of epoxy/thermosetting plastics (column 3, lines 1-2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's prior art as shown in figure 1, (AAPA, hereinafter) in view of Chen et al. [US 6,263,957].

Regarding claims 7-8, AAPA discloses a package structure that is compatible with a cooling system (figure 1), comprising:

- a carrier (100);
- at least a chip (140), arranged on the carrier and electrically connected to the carrier;
- a mold compound (170), covering the chip and one surface of the carrier (figure 1); and
- a heat sink (180) being mounted on the top of the mold compound.

AAPA discloses the instant claimed invention except for a cooling tubule disposed on an outer surface of the mold compound, wherein the cooling tubule is connected to the cooling system, wherein the cooling system is a closed system and a fluid driven by a pump circulates within the cooling tubule and the cooling system.

Chen et al. disclose an integrated cooling device (figures 1a, 1b and 2-3) having a cooling tubule (160) mounted on a top of at least one component (100, figure 1a), wherein the cooling tubule is connected to the cooling system (figure 1a), wherein the cooling system is a closed system and a fluid driven by a pump (170) circulates within the cooling tubule and the cooling system (figure 3).

It would have been obvious to a person having ordinary skill in the art at the time invention was made to mount the cooling system of Chen et al. on the top of the mold compound of the AAPA, for the purpose of providing better heat dissipation.

Regarding claim 9, Chen et al., further disclose fluid being selected from the group consisting of coolant (column 3, lines 39-40).

It would have been obvious to a person having ordinary skill in the art at the time invention was made to use a coolant in the cooling system in order to dissipate heat.

Regarding claim 10, Chen et al. further disclose the cooling system comprising a cooler/heat exchanger (322, figure 3) connected to the cooling tubing.

It would have been obvious to a person having ordinary skill in the art at the time invention was made to include the cooler with the cooling tubing for the purpose of accelerating heat dissipation.

5. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Chen et al. as applied to claim 7 above, and further in view of Weld.

Regarding claims 11-12, AAPA in view of Chen et al. disclose the instant claimed invention except for the mold compound being thermosetting plastic/epoxy resin.

Weld discloses a mold compound being formed of epoxy/thermosetting plastics (column 3, lines 1-2).

It would have been obvious to a person having ordinary skill in the art at the time invention was made to use epoxy resin/thermosetting plastic material for the compound of the AAPA in view of Chen et al., for the purpose of conducting better heat from the chip.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

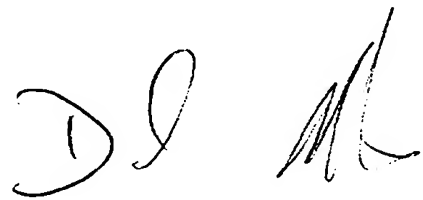
- Kurokawa [US 5,291,064];
- Zuo et al. [US 6,437,437]; and
- Sekhon et al. [US 4,047,198].

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung S Bui whose telephone number is (703) 305-8024. The examiner can normally be reached on Monday-Friday 8:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David S Martin can be reached on (703) 308-3121. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-5115.

12/12/03
HB

A handwritten signature in black ink, appearing to read 'DL' followed by a stylized 'M'.

DAVID MARTIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800